SUPPLEMENT.

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FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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Royal Cornwall Polytechnic, 1877.
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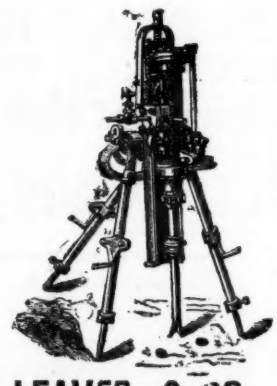

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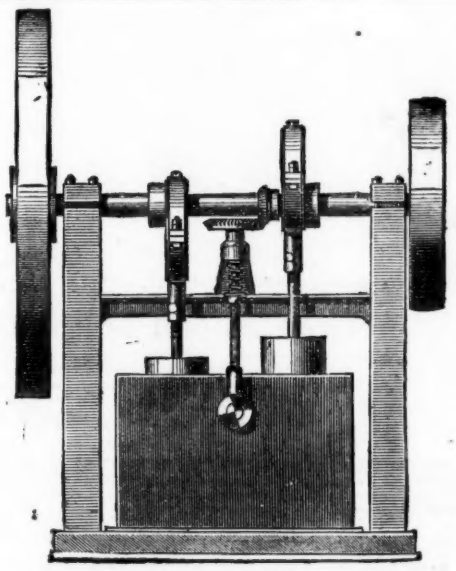

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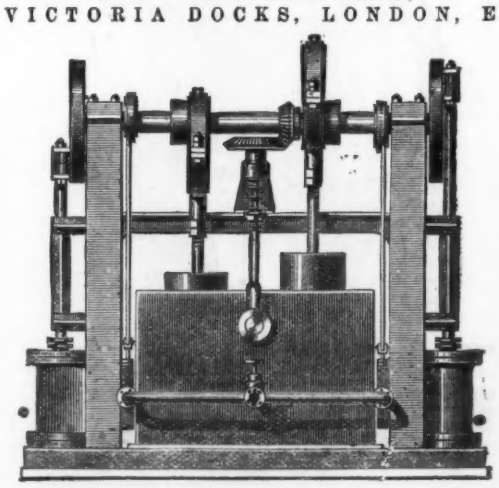

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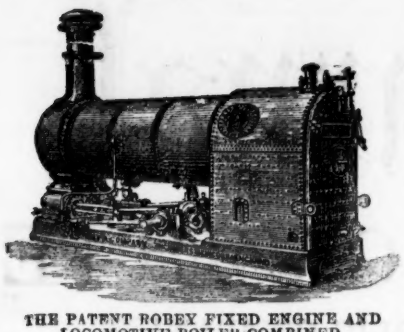

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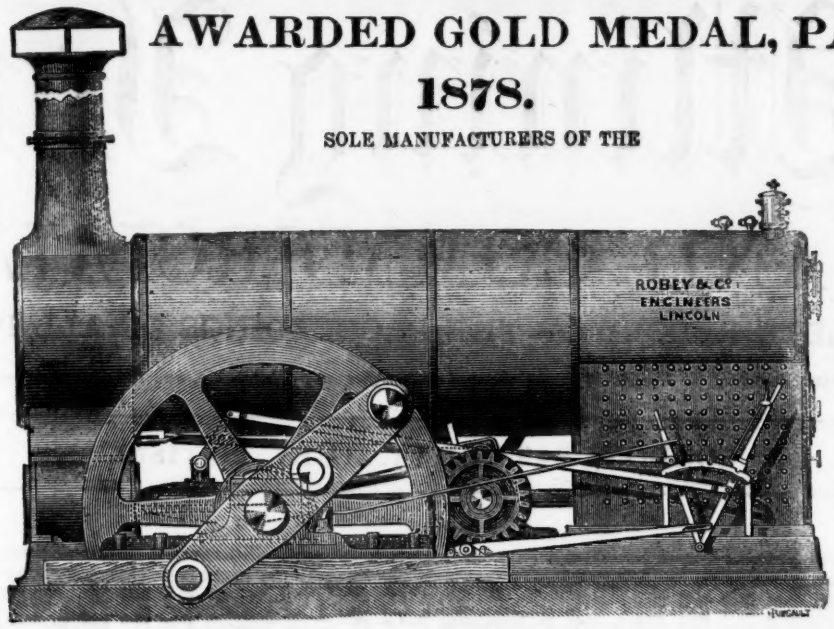

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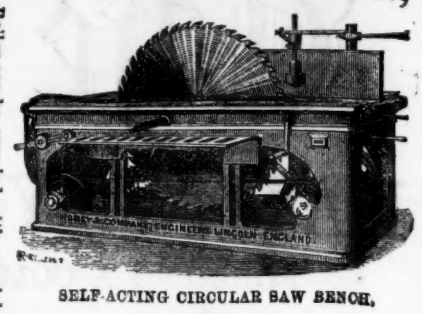

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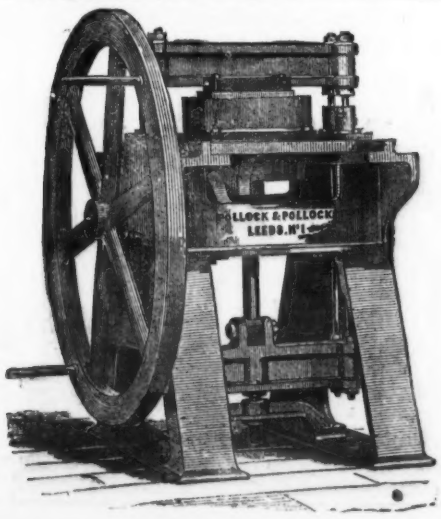

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Original Correspondence.

DEEP MINES.

SIR,—Will any reader please answer the following question in the next issue of the *Mining Journal*, if convenient? I am aware that the Deep Duffryn Coal Pit, owned by Messrs. Nixon, Taylor, and Cory, Mountain Ash, South Wales, is generally supposed to be the deepest pit in that part of the kingdom: but I am told that a silver-lead mine at or near Christow, near Exeter, is much deeper. If some correspondent will kindly say if such is the case, and if possible the relative depths of each, he will greatly oblige— J. H.
Highbury, July 21.

THE LONDON COAL SUPPLY.

SIR,—*En resumé* of my correspondence in last week's Journal, in which upwards of one-fourth small, termed useless refuse (*sic*) by an Admiralty report, is shown to exist in Welsh smokeless steam coal, I have elicited through personal communication with the leading inspecting engineers of lines of steamers from London *via* Suez and the Cape that, according to their lengthened experience, there is one-third small in Welsh steam coal. The senior partner of the chief London coal firm has informed me that fully one-third Welsh small is shipped on board such steamers at coaling stations, a prospectus advertised this week in the London papers stating that Welsh coal is depreciated to the extent of 60 per cent. loss of its power in a single year.

In the depressed state of our shipping it is of the greatest importance that an alleviation in the working expenses be sought for in a reduction of the cost of brittle steam coal delivered on board, and in an immunity from breakage, hundreds of tons of Welsh steam coal having, through trituration in a lengthened rail conveyance, breakage in falling from the shoots in Chelsea basin and at Brentford into the barges, and loading into the docks, been thrown overboard, and otherwise rejected as unfit for use. The most rigorous scrutiny of my data fully bears me out in submitting to the steamship owners, colliery owners, and metropolitan consumers of steam coal that the best qualities of Welsh smokeless steam coal can be delivered water-borne the entire distance from the pit's mouth into the bunkers of steamers in the Thames docks and in the river, as well as alongside coal wharves on both sides of the Thames, and steamers in the Medway, at Harwich, and Dover, at 10s. a ton under the cost of transit by rail and attendant expenses, with regularity of supply and not exposed—either in decked barges on the Glamorganshire Canal, or in decked barges on the Thames—to the effects of the weather, from which the Welsh coal suffers so much deterioration in the great distance in open trucks and open barges under the present system of transit. There is no effective check upon the quantity put on board steamers otherwise than trusting to the honour of the coal merchant. At foreign coaling stations and in our dependencies the coal is all weighed and tallied; and knowing the coal robberies under their own eyes no strict check is kept. In the Tyne the keels are weighed and marked, similar to the steamers' draught of water, which is not now the case in London with barges. Coal merchants delivering coal to householders, &c., are by law compelled to carry weights and scales with their vans, whereas afloat there is no check to robbery. By the proposed system each sack can be weighed, or a number of sacks selected to test the accuracy of the weight, each sack alike specially made to hold more than the 2 cwts. charged.

In my last week's letter I showed that as much as 12 tons short weight in one barge load had been discovered in London. The following tabular statement shows a saving effected by this undertaking of 10s. a ton on the current selling price of Welsh smokeless steam coal delivered into bunkers on the mere transit from Wales, with incidental expenses, and a saving of more than the total cost of the coal, the conveyance, and the shipping expenses, by immunity from breakage through conveyance in sacks.

	Per ton.	
Canal and Cardiff dues and lighterage	1s.	6d.
Sea freight	1	6
Thames lighterage	1	2
City dues, 1s. 1d., less 1s. returned on export	0	1
Insurance	0	1
Labourage	2	0
Sacks	0	4
Management	0	2
Total	6	10

Interest, 5 per cent.	1s.	0½d.
Dividend, 10 per cent.	1	7
Total	2	7½
Rail, 8s. 11d., less 1s. City dues returned on export	Per ton. 7s.	11d.
Trucks, 9d.; lighterage, 1s.	1	9
Loading into bunkers	1	6
Breakage	5	10
Total	17	0

	Per ton. 6s.	0d.
Cost of Welsh smokeless steam coal at pits		
Transit, &c., as precited	6	10
Total	12	10
Rail transit, &c., aforesaid from Wales and 6s. for coal at pit's mouth	23	0
Saving	10	2
Cost of Yorkshire steam coal at pits	6s.	0d.
Transit from pits into steamers' bunkers in London, as shown in last week's letter, 5s. 8d., less return of 1s. City dues	4	8
Total	10	8
Cost of Welsh coal, rail transit, &c., as above	23	0
Saving	12	4

Add to 10s. 2d. and 12s. 4d. per ton one-third of 40s. outward freight, or 13s. 4d., in perfect consonance with Admiralty report quoted in my last, we arrive at a saving of 23s. 6d. and 25s. 8d. per ton. To cover the hitherto existing cost of the coal delivered into bunkers, we can reduce the boon several shillings a ton, raising the cost at pit's mouth for the benefit of the coalowners and miners. If we further add expenses incidental to coaling stations, which are extremely heavy, injury to machinery through coal dust, extra friction, wear and tear, additional labour and stoking, with the incontrovertable difficulty of keeping up steam, the fluctuation being rendered less frequent by cleaning out the fires so often through the surcharge of small coal, so difficult even with the greatest draught to render incandescent in the case of smokeless Welsh steam coal, it will be seen how desirable it is to obtain tender or brittle coal denuded of small. The cost of each series consisting of one sea-going steamer, with appertaining hydraulic cranes relays of decked lighters and tugs, also sacks, was stated in my last at 165,000*l*. The annual working expenses are as follow:—

Insurance, repairs, redemption, as last stated.	£3040	
Port charges, London and Medway	640	
Canal and Cardiff dues and lighterage, stated as aforesaid in general account.		
Fuel and engine stores	3632	
Wages	3438	= £15,750
Thames tugs and lighters cost, as in my last.	£48,000	
Insurance, repairs, redemption	£7200	
Fuel and engine stores	725	
Wages	4275	= £12,200

Glamorganshire Canal and Cardiff dues and lighterage, 1s. 6d. per ton. To eschew prolixity the most minute details are held at the disposal of the investing public.

The screw-collier through velocity of voyages has superseded the sailing collier. The Suez Canal has enabled the screw-steamer, through velocity of voyages, to absorb the valuable passenger and goods traffic of sailing ships, and although not so comprehensible the statement of physicists that in hydrogen each atom has its direction entirely altered by collision with other atoms seventeen hundred million times per second, nor that of an eminent entomologist, who has described and figured upwards of four thousand muscles in a caterpillar, it is fully proven that London is mulcted to the incredible extent of fifteenfold the cost of water-carriage of indigenous coal to the great centres of consumption in the United States of America, for some time exporting coal to Europe. The chairmen of the London and North-Western and Great Eastern, the general managers of the Midland and Great Northern have proven in the most distinct manner the impossibility of railways competing with water carriage in the transport of coal.
Little Tower-street, July 22. WM. JOSEPH THOMPSON.

THE PRICE OF COAL.

SIR,—In the interesting letter in the Supplement of last week's Journal on the London Coal Supply, by Mr. W. J. Thompson, it is stated on the authority of Engineer, Engineering, and Iron, that the sales of Silkstone coal effected at the pits was 5s. per ton. This statement, if uncorrected, must be most misleading, therefore I will trouble you to allow me to give it the most emphatic contradiction possible. At the South Yorkshire collieries, which are evidently those meant, the price is not lower than 7s. 6d. per ton, and in some instances rather more. This in no way affects the interesting statement of Mr. Thompson as to the relative cost of carriage of coal to London from South Yorkshire by railway and sea.
A SOUTH YORKSHIRE COALOWNER.

A NEW EXPLOSIVE—TITANITE.

SIR,—On looking over the Journal of Saturday last I note a letter signed "Sombrero," in which there is a statement to the effect that there is an explosive named "titanite," manufactured in Belgium and Germany, which is 30 per cent. stronger than dynamite, and which can be sold in this country. If any reader will kindly give the name and address of the companies manufacturing the article it will be useful information to many of your readers; also, say if it is correct that this explosive can be sold in England and not be an infringement of Nobel's Explosives Company's patent.
Cumberland, July 21. APATITE.

ELECTRO-DEPOSITION OF NICKEL.

SIR,—Until comparatively recently nickel has been so costly that its use has been much limited, but since the marvellous discoveries of nickel ores in New Caledonia and elsewhere the beauty and durability of the metal has become more widely recognised. Many of the nickel manufactures are now considered to surpass silver in appearance, whilst the price is very much lower. It is now likely to become a still greater favourite as Mr. Edward Weston, of Newark, New Jersey has discovered a method of electro-deposition of nickel and for producing malleable ductile nickel suitable for manufacturing into solid nickel articles. It is well known that nickel can be deposited in a condition more or less approaching the reguline state, according to the nature of the solution employed. Solutions composed of the double sulphate of nickel and ammonium, or of the double chloride of nickel and ammonium, have heretofore been generally preferred as giving the best results. Both of these solutions under the action of the current evolve more or less hydrogen. A portion of the ammonium salt is decomposed, and the metal deposited is always hard and tends to separate in laminæ from the surface on which it has been deposited. This tendency increases as the thickness of the deposit is increased. It is probable that the hardness of the deposited nickel is to some extent owing to the presence of the hydrogen with which it is associated.

The deposit obtained from the double chloride has a peculiarly matted surface, and is difficult to polish and extremely liable to tarnish on exposure to the air. The deposit obtained from the double sulphate is much easier to polish, but is also very hard and inflexible, and if thick is especially liable to separate in laminæ from the surface on which it is deposited. The solution of the double chloride of nickel and ammonium is better adapted for coating iron with nickel than the double sulphate solution, the double sulphate solution answering better for brass. Both of these solutions are gradually changed by use as electrolytes; thus, the ammonium salt is decomposed by the action of the current, and free ammonia is evolved. The solution becomes richer in nickel, and the amount of ammonium salt in the solution gradually decreases. By these changes in the solution the qualities of the deposited metal as to colour, hardness, and flexibility are gradually changed. These changes, which involve serious difficulties in the management of the solution during the act of electro-deposition, and which it is desirable to avoid, even if only a thin deposit is required, as in electro-plating, are almost insuperable when a thick deposit is required as in the case of electrotyping.

These difficulties are completely overcome by Mr. Weston's invention, which consists chiefly in the production and use of a constant nickel solution—that is a perfect nickel solution, which although continuously used as an electrolyte permanently preserves its composition. The most important feature is the discovery that the deposition upon the cathode of the subsalts of nickel is entirely prevented when the solution employed is made to contain a solution of boracic acid or of compounds of boracic acid; and the further discovery that borate of nickel although insoluble in water is very soluble in many of the solutions of salts of nickel, and that solutions of borate of nickel with salts of nickel afford a perfectly reguline deposit, and are especially efficient for electro-plating and electrotyping purposes. The deposit is, moreover, of a beautiful white colour, and is easy to polish, whilst it is very flexible and tough, and adheres firmly to the surface upon which it is deposited. In compounding the said constant solution the proportions of the ingredients are not arbitrary, but may be varied without changing the distinctive characteristic of the solution, that of constancy. An excellent solution may be made by using 5 parts of chloride of nickel and 2 parts of boracic acid. Another good solution may be made by using 3 parts of sulphate of nickel and 1 part of boracic acid. Either of these solutions may be slightly improved by the addition of caustic potash, soda, or lime until the precipitates formed cease to be dissolved. It will be found that the metal obtained by electro-deposition from either of these solutions is remarkably tough, coherent, flexible, and smooth, malleable and ductile.

The rapidity, ease, and certainty with which the electro-deposition of the nickel is effected when the boracic acid is added is marvellous, and Mr. Weston is enabled to produce by this means considerable masses of nickel by electrolysis. It has not heretofore been practicable to make nickel electrotypes because of the nicety of adjustment necessary both in maintaining the composition of the solution and in regulating the strength of the current employed. Constant care and watchfulness have had to be exercised to preserve the composition of the solution by the addition of ingredients rendered necessary by the changes here referred to, in order to prevent the separation of nickel from the mould. By reason of the extreme slowness of the depositing operation, nickel electrotypes, even when by the exercise of great skill and watchfulness they have been made, have been too costly for practical use. Furthermore, the deposit has always been brittle and could not be annealed without warping out of shape. By this invention all of these difficulties are avoided, and the art of producing electrotypes of nickel, and of depositing considerable masses of nickel upon black-leaded or metallised surfaces, is made perfectly practicable. The power of boracic acid or its compounds to prevent the deposition of sub-salts of nickel on the cathode is so great that solutions which have not been heretofore capable of practical use, because of the sub-salts of nickel deposited from them, can be made practically effective solutions by the addition of boracic acid, even in minute quantities. For example, the solution of the double salts of nickel and potassium, the solution of the double sulphate of nickel and magnesium, and other solutions of similar composition which heretofore could not be used, are converted into excellent plating solutions by the addition of a small quantity of boracic acid, either in its free or combined state.

It will, of course, be understood that although Mr. Weston prefers to avoid the use of ammonium salts in the composition of his solutions he does not in all cases reject the use of such salts; but he finds that solutions of double salts of nickel and ammonia can be materially improved by the addition of boracic acid or its combinations. By this invention electrotypes in nickel are as easily made as electrotypes in copper. His deposit spreads rapidly and evenly over the plumbago or other conducting surface of the mould, and the metal obtained from his solutions is ductile and malleable, and when annealed can be drawn into wire or rolled and manufactured into various articles which are now usually made of brass or copper, results which have never heretofore been obtained. The metal deposited by these solutions adheres so firmly that it becomes possible to stamp, spin, or shape into a variety of forms for various uses sheets of metal coated with nickel. Even a small percentage of boracic acid may be applied with especially good results to solutions of chloride of nickel with chloride of magnesium, chloride of nickel with chloride of sodium, chloride of nickel with chloride of calcium, and to all of the solutions of either the chlorides or sulphates of nickel with the chlorides or sulphates of all the alkalies or alkaline earths; and furthermore, tartrates and other alkaline salts can be used, the percentage of boracic acid being in all cases varied at will.
New York, June 20. H. E. E.

CRANSTON'S ROCK DRILL.

SIR,—Will you allow me to state that the 18,000 ft. of blast holes drilled by the machine in the 12 months run at the Trimdon Grange Limestone Quarries, county Durham, were 2¼ in. in diameter, the holes varying in depth from 4 to 8 ft. each. I observe in the *Mining Journal* of last week, in the reports of British Mines, that Capt. David Williams, of the West Pateley Bridge Lead Mining Company, Yorkshire, where my rock-drill machinery has recently been set to work, states that "the ground is still tight and spare for driving. Cranston's Drill is working well, and driving the cross-cut twice the speed of hand labour and at a less cost." J. G. CRANSTON.
Newcastle-upon-Tyne, July 23.

ROCK-DRILLING MACHINERY.

SIR,—We have noticed the letter from Messrs. Hathorn and Co. which appeared in last Saturday's Journal under the above heading, and will merely say, in order to close the matter, that whatever Messrs. Hathorn and Co. may write to the contrary we have not made a single untrue statement, as may be verified by an examination of the correspondence between ourselves and the American branch of the Ingersoll Company, which we shall be pleased to lay before any person sufficiently interested in the matter desirous of learning the truth. It was perhaps injudicious on our part to have undertaken to correct the errors which were found in your late notice of the two rock-drills, as it has simply served to give Messrs. Hathorn and Co. an opportunity of appropriating the columns reserved for correspondence to advertising their drill.
LE GROS, MAYNE, LEAVER, AND CO.

CANADIAN MINING NOTES—No. XXVII.

SIR,—The great industrial energies of the United States are recovering at last from the hard times, and already there is a stir among the people. Capitalists have become tired of keeping their money shut up, and the streams of capital are now beginning to make their way over the land.

One of the many industrial pursuits which has assumed large proportions, and is destined, probably, to become greater, is the taking up of large tracts of land for grazing purposes. I hear of 400 square miles owned by one party. He wishes to obtain 15,000*l.* sterling on it for several years—to stock it—at 10 per cent. interest, and then he proposes to raise cattle and send them to England.

In the North-West there are great facilities for large tracts, which will not be left to offer in two years from now, and it certainly seems strange, with all the money in England, that the sporting men and gentlemen of means have not turned their attention to it. What is to prevent them getting a large tract and forming an immense park, where there could be preserves of deer, of buffalo, and of wild fowl. England is too small, and land is too dear; but when fifteen days travel will place a sportsman in London on his park in the North-West, where he could enjoy a month or two of splendid sport and be back in Old England for Christmas, it does not appear to me to be an idea which is unworthy of attention. Add to this the increase in the value of the land as settlement progresses, and looking at it merely through the spectacles of gain, a large inducement is now open. The only preserves we have in the province of Ontario is at Long Point, on Lake Erie. These were bought by a small number of gentlemen, and in the autumn season the duck shooting is excellent. The shares can hardly be bought at all, and are easily sold at a premium. How much greater would a park, such as I describe, become more valuable as the years pass? Now is the time to obtain it.

I notice the advertisement of the Canada Lands and Loan Agency, Wellington-street East, Toronto. The idea which prompted the inauguration of this business appears to be extremely good. Many families of means in the Old Country may have become comparatively reduced, and as they can live in Canada at a much less figure than in England, give their children good education, and enjoy life without being continually reminded of their misfortune, this Agency offers to give them the necessary information should they desire to adopt that course.

With regard to the undeveloped resources, the mineral lands and timber limits, people can obtain information. It seems strange that no book has been written on Canada which would be an accurate handbook and give the necessary and reliable information a settler requires to obtain when he is thinking of changing his residence. Such a book, I should think, would be well received in England, and it is a wonder some of the energetic publishers of that country have not yet produced one. It should, however, be written by a Canadian who has lived his life in Canada, and is intimately acquainted with all the resources and manners of the country. There are many men capable of that—Masters of Arts of our Universities, able to write and possessed of the real knowledge necessary to produce such a book.

The ministers who have in charge the loan for $100,000,000 will go over by this week's mail—Sir John A. McDonald and Sir Charles Tupper. This money will be expended on building the Canadian Pacific Railway, and when it is entered upon with vigour there will be a great deal of work to be done in Canada. BOURNONITE.
Toronto, June 28.

THE ISTHMUS OF PANAMA CANAL.

SIR,—The promoters of the Isthmus of Panama Canal appear to be making very satisfactory progress with their preliminary operations, and there can be no doubt that the name of Mr. Ferdinand de Lesseps affords a considerable guarantee that the work will be at least attempted. That the idea is stupendous is beyond doubt, and that there are no engineering impossibilities is certain; but there are certain circumstances connected with the enterprise which make it questionable whether it would ever prove a commercial success. A ship tunnel 3¾ English miles long is rather a dangerous undertaking, and not only so but an objectionable one, because the sailing through such a tunnel of two lines of ships one in each direction would offer some grave inconveniences, not the least being the difficulty of preventing collision, whilst if ships were allowed to go in one direction only the tunnel would have no advantage as compared with the locks. But, in my opinion, judging from the report of Messrs. Wyse and Reclus, the tunnel could equally be dispensed with, and if this be so the Panama Canal might at least be as profitable to those concerned as the Suez Canal.

It seems to be beyond question that Messrs. Wyse and Reclus have surveyed a line which is available for a level canal except as to 3¾ miles—a length which could, in all probability, be as cheaply made as an open cutting, and quite as quickly; but before any figures can be given it is necessary to know what is the height of the mountain under which the proposed tunnel is to pass. Under any circumstances it will be practically a triangle with a base line 3¾ miles long, and although this appears enormous, especially that there must be some batter (say, 1 in 10) to make the sides stand, the open-cut would have an advantage over the tunnel, because with the tunnel only two ends could be kept going at once, whilst on the open-cut 1000 pares of men could be kept going simultaneously.

As to the details of working, the open-cut figures are again necessary, but roughly speaking, the broken stone would be disposed of by tipping it down the side of the mountain. Supposing the mountain to be 10,000 ft. high (I believe there are none nearly so high on the Isthmus) a ledge, or tip-plat, 500 yards long, and 100 yards

from front to back would be cut at one-third up the side of the mountain. From this tip-plat a line of railway would be carried for one mile each way, exactly horizontal, and crossing the line of the canal at about right angles. Mining operations would be commenced near the summit of the mountain, and the debris rolled down to the tip-plat daily between midnight and 4 A.M., but at no other time. Long natural shoots of this kind have already been successfully tried. A margin of one hour before and after might be allowed for safety, which would allow 18 hours a day for clearing the tip-plat, the stuff from which would be carried along the railways and tipped down the mountain side, forming immense spoil banks at a distance of one mile on each side of the line of the canal, and, therefore, well out of the way. The rapidity with which even this enormous open-cut would be made as compared with the tunnel would be greater than many suppose, especially as similar operations would, of course, be going on at the same time on both sides of the mountain. With regard to cost I believe that as the tunnel would be far more difficult to make and would require lining, whilst the open-cut would only here and there require any support whatever, economy would be entirely on the side of the open-cut. If those interested will publish the figures showing the dimensions of the mountain which has to be passed through, I am sure they would find many English engineers who would suggest a better scheme than a long tunnel on a ship canal, and their suggestion might make the concern a great success. INTERNATIONAL.

Manchester, July 21.

WIND-POWER ENGINES.

SIR,—At the recent Exhibition of the Royal Agricultural Society I observed a wind-power engine exhibited by Mr. Hett, of Lincoln, I believe, but it appeared to me that the sails of the mill would form a circle about 5 ft. diameter, and that it was only moving up and down a rod of iron about 10 ft. long and ½ in. thick. It occurred to me that this effectually answered the recommendation that wind-power should be employed for mining purposes, for at the same rate the pumping of only 50 gallons per minute from a depth of only 20 fms. would require a diameter of mill which would render the ordinary windmill altogether out of the question.

But this objection does not apply to the form of engine which would be applicable to mines, and which has been referred to in the Journal as the Concanen wind engine. In the Hett Mill, having vanes 5 feet diameter from point to point, the area for the wind to act upon would only be about 18 square feet, whilst we should have a structure 15 feet high, and reckoning from extremity of the supports 15 feet diameter of plan. Now, a Concanen engine of that size, 15 feet diameter by 15 feet high, would have the wind always acting on an area of about 270 square feet, and this area could readily be increased without augmenting the diameter of the engine. The Concanen engine has the further advantage that there is very little back pressure, so that the largest possible quantity of power would be obtained. The cost of the engine would be very small, as it could be almost entirely made by the mine carpenter and smith.

July 16. ECONOMY.

PREVENTING BLOW HOLES IN CAST METAL.

SIR,—I believe it is generally acknowledged that the value and strength of a casting depends upon its freedom from blow holes, and the number of propositions which have been made for avoiding these has been very great, yet none of them have proved a complete remedy. I believe, however, that the invention of Mr. Theo. Fleitmann, of Iserlohn, will really produce an absolutely homogeneous casting. It is well known that in the case of many metals great difficulties are met with in obtaining a fibrous structure on their being melted and cast, but such fibrous structure must especially be obtained in those cases where it is intended to subject the object cast to further mechanical treatment. For this reason it has hitherto been quite impossible to produce by the process of casting nickel or cobalt objects which could be subjected to a subsequent treatment of pressure, rolling, hammering, &c. They have always shown a crystalline fracture with blow holes, and have broken on being subjected to mechanical treatment. The electrolytic process as also the process of cementation (reduction from oxide) have, however, shown that nickel metal in itself may be perfectly well adapted to sustain any mechanical treatment.

Considering the very much greater commercial value which the process of producing objects by casting presents as compared with the electrolytic process and cementation, it becomes of great importance to find a means of producing objects from nickel by casting, having a fibrous structure free from blow holes. During 15 years Mr. Fleitmann has made experiments in this direction, and has finally found the solution of the problem to consist in the addition of magnesium to the melted nickel metal. The metal thus produced shows a fibrous structure perfectly free from blow holes, and as experiments have proved allowing of every kind of mechanical treatment. Mr. Fleitmann does not deem it necessary now to enter into an examination of the chemical action which here takes place, as to whether the magnesium by its presence causes the result, or as to whether it destroys injurious admixtures (absorbed gases, &c.) Further experiments with other metals, such as iron, steel, copper, and their alloys with nickel, tin, and zinc, have led to the same result. A small addition of magnesium would also give to these metals considerably greater elasticity and ductility than that which they possess without the addition of magnesium.

The carrying out of the process is a very simple operation, and substantially consists in introducing the requisite quantity of magnesium through a small opening in the cover of the crucible containing the molten metal after it has been cleared of all dross, and the mixture of the same together by agitation of the vessel. It is somewhat difficult to know the proportionately proper temperature for producing the action; before the introduction of the magnesium the metal to be treated must be heated considerably above its melting point, as otherwise it may happen that after the addition of the magnesium the whole mass will congeal or be to thick for pouring. All that has here been said with regard to nickel applies equally to cobalt, which is an analogous metal. To make the matter clear Mr. Fleitmann's invention may be summed up as consisting in the use of an addition of magnesium to other metals, especially to nickel, cobalt, iron, steel, copper, and to the alloys of this metal with nickel, tin, and zinc, for the purpose of producing in the casting of these metals and metal alloys objects of greater ductility, of more fibrous structure, and without blow holes.—*Paris, July 19.* NOUMEA.

CORNISH MINING.

SIR,—The mines of Cornwall, as a speculative industry, seem to be losing their position on the commercial exchanges of the empire. The insufficiency of surplus capital in the county available for extensive adventure leaves no alternative but to apply to capitalists in the great centres of commercial wealth to join in the enterprise of laying open the mineral treasures of the county, and too much publicity cannot be given of its progress. Unfortunately Cornishmen seem to think they thrive best in mystery, and thus one of the finest fields for speculation is often looked upon by capitalists with prejudice and distrust. Thus the reluctance of managers to report their mines fortnightly or monthly in the weekly or daily papers keeps a large amount of capital from finding its way into the mines of the county. In the absence of such reports "Bulls" or "Bears" raise or depreciate the value of mining property with impunity, and the operators quote what they consider the value of shares, such quotations being looked on by the uninitiated as the guide for purchase or disposal. In a falling market the absence of official reports for the guidance of out-shareholders—to which I say they are entitled—creates uneasiness and distrust, and causes a superabundance of shares to be thrown on the market, lowering the price and benefiting only those who least deserve it. Within the last two months the shares of South Frances have fallen in market price 4*l.* each, or an aggregate value on the property of 18,000*l.*, although its intrinsic value, both present and prospective, is even greater than at the last meeting of shareholders, when a dividend of 12s. 6d. per share was declared, taking which as a basis its present market value is only three years purchase or 33 per cent., an investment not often to be met with even in the present depressed times. A published report from the manager would allay misgivings and arrest falls in the price of the stock. I hope on some future occasion to refer to some other mines in the county but little known to outsiders, paying equally good interest, with prospects of increasing present returns, requiring only publicity to give them the market value they are likely to command. CHARLES BAWDEN.

St. Day, Scorrier, Cornwall, July 23.

THE MINING INTEREST—LORDS' DUES, &c.

SIR,—I quite agree with your correspondent "Bono," in last week's Journal, that dues should only be paid on profits, and not on the whole produce. But still I think he hardly did justice to those very liberal landed proprietors who have so generously and thoughtfully given up the whole of their dues until the mines situated on their properties should be making profits, maintaining themselves, or at least during pleasure, which may imply longer. In this liberality let us take it for granted there are a few landed gentlemen who have not only the speculators' interest at heart but could see nothing but want and destitution in the ranks of our mining population if they did not so act, and only want other landowners to follow in their wake to carry their liberality still further. I hope Mr. Bright's prophecy will be fulfilled, and that our Government will not be able to close the door it is about to open on the question of agriculture without discussing the other interests of our land, and that the mining interest may have its just and fair proportion in such discussions. It behoves the whole of our mining community to memorialise some eloquent and efficient member of the House of Commons to ask our Government to consider the mining interest of our country, and not let foreign countries beat us out of every market. But there is nothing that would assist in restoring a speculative spirit in mining—considering the present price of metals—like liberality among our landed proprietors, who have it in their power to be a blessing in times of need to the most deserving and thankful part of our population—the speculative investor and the working miner. W. H. B.

CORNISH MINE DIALING.

SIR,—I notice in last Saturday's Supplement to the Journal the remarks of your correspondents, "Trigon" and "B. J.," on my letter and diagram on Cornish Mine Dialing, which appeared in the Supplement of July 12. The first-named of these gentlemen says that he carefully read my letter. I trust that he will have been rewarded for his pains; that it will do him good; and that he may derive from it all the benefit that it was designed to bestow. The expression, however, which I used—"I am feeling my way"—this gentleman seems to have turned into ridicule: he says that I was "groping my way in the dark." If he know as much as I am willing to give him credit for, he knows perfectly my meaning, and as to whether the expression was applicable under the circumstances described or not. He knows that the purpose for which it was used was to teach those who know less of the subject than himself. He knows, also, that a man who is acquainted with Euclid is not necessitated to *grope*, in reference to angles. "Trigon" must have far, far outlived the age of puberty if I was not fully enlightened on this subject, and had grown old in the dialing of mines ere he was born.

Carefully as this gentleman might have read my letter, and clever as he may be, his atmosphere would seem to have been somewhat misty at the time of his reading. He apparently understood, or supposed, that I had conveyed the idea that I could have seen, or did see, the spot C from that of A. Had this been the case, why the second draught, when one would have sufficed? But even then "10 seconds" would have been rather a limited time for the accomplishment of the work: anything like a good needle, even, would not settle in 10 seconds. Aware that it was quite unnecessary to leave a pin driven into the ground at the point B, I did not say that one should be left there; but quite to the contrary—I said that all that would be required to be done was to go to A and measure out 46 fms. 2 ft. on an angle of 6° to the south of east. I am either purposely, or through mist, made to say that which I did not. He also says that a modern dialer would have done the work in half the time, and with half the trouble, than by the method which I would adopt. I fear that "Trigon" is rather too fast, too presumptuous. With the way of sight so perfectly obstructed, as in the case supposed, I defy "Trigon" or anyone else to find the place sought in any other way, in any less time, or with any less trouble than by the method which I pointed out, and which, under the same circumstances, is the only proper, practicable, simple, and easy one, unless he can do as this gentleman seems to infer that he can—*i.e.*, measure what he cannot see. My friend is, with me, like Dr. Colenso was with the Pentateuch. The doctor found fault with the statement of Moses, but suggested nothing better as a substitute. I pointed out the faults in the method of dialing in the mines of Cornwall, but also pointed out the remedy.

Whoever this gentleman, who calls himself "Trigon," may be he is evidently not one of those for whose benefit my letter and diagram were intended. He is not a miner; he never was; he never will be one. "B. J." I would rather think, is one of the fraternity. He thinks that he can dial; perhaps he can, and possibly on the best and most approved principle. My Cornish mine-manager friend, of the mountain, never having seen any method other than his own, also thought that he could dial, and consequently undertook what he could not accomplish. "B. J." appears to think that I underrate the intelligence of the Cornish agents in supposing that they are "ignorant of such a simple art." Simple it should be, particularly in the Cornish mines, seeing the plain, methodical, and regular way in which they are worked; but in a mine which is, as it were, honey-combed, worked most extensively, and dug in every conceivable and inconceivable way without order or regulation, of which I have seen many, it is not, after all, so exceedingly simple. I accompanied my friend of the mountain, an "eminent mine manager," and a gentleman, I think, from the North of England on two different occasions to dial mines of this description, they and I taking together the same draughts and angles; but in mapping their work they got into an inextricable labyrinth of confusion, that they could neither make head nor tail of it. I have said that the Cornish mines are methodically worked. Have we anything else to expect seeing that they are managed by the best miners in the world? But as to the dialing, all that I have to say about it is to repeat what I have before said—that an easy, accurate, and scientific method seems to be still unknown within the mining circle; if otherwise, why do I see that the civil engineer is so frequently employed to do the dialing in so many mines? Will your correspondents please answer this question.

My object in writing the letter with a diagram was to try to instruct those who might wish to improve upon what they already know—to "instruct the ignorant and those who are out of the way." But, if only "taking the will for the deed," would not their commendations and their thanks be more becoming than their criticism? Let them criticise, however, as much as they like; I fear it not. This is all I shall say as to dialing. But, Sir, before I close, permit me to ask why your correspondents spell dialing with two ells? Thus, dialling. I suppose that their answer, if any, would be that of some gentlemen who some time ago sent me a paper in which they had spelled *balloting* with two tees. "I asked them why they doubled the last t?" To this one of them replied—"I believe that that is right." "Why do you think so?" "Because it looks better." "Is that all you know about it?" "Yes." I appealed to the second. "What do you think about it?" "Well, I believe it is right." "Why do you think so?" "Because I see others spell it in that way." "Is that all that you know about it?" "Yes." I gave them the rule, when the third said—"We are all ignorant of the matter; it is time to go to school." These gentlemen were members of a "literary and scientific institution." Your correspondents, as well as mine, should know that the rule which enjoins the doubling of the last consonant in regret, beset, &c., before the terminations ed, er, ing, &c., prohibits it before the like terminations in such verbs as dial, travel, &c., and that although they are accustomed to see the words written travelled, dialled, and so on, doubling the last consonant, yet it is in violation of an invariable grammatical rule, and equally is the rule violated by doubling the last consonant in ballot, rivet, &c., before these terminations; and although we invariably see worshipping with two pees, it is a violation of the rule. If worshipping with the two pees be correct then, by the same rule, it should be galloping, wallopping, scollopping, &c.—a thing which is never seen. I shall not set up as a teacher of grammar, otherwise, perhaps, I might endeavour to put your correspondents right about the spelling of dialing by explaining to them the rule, yet as they do not appear to appreciate my effort to teach them the way to dial, they would scarcely have deserved it. I shall, therefore, leave them at liberty to try to find out their error through some other channel.

I. L.

IS IT RIGHT TO PAY ANY PURCHASE-MONEY FOR MINES?

SIR,—In my former letters I wrote nothing which was not called for by force of circumstances. I am pleased that "Looker On" has written in such a straightforward and candid manner. I think, however, he will see that he was mistaken when he says "M. A. Leon reproaches Englishmen for being ignorant of the one work on the subject yet published in this country," for I wrote in the singular, and only referred to one person who has been very conspicuous in writing under a plurality of names. I did not, therefore, include Englishmen in a general way. My attention was drawn to Mr. Hoskold's work through an advertisement in the *Mining Journal*, and I procured a copy of it. It seems strange, therefore, that "Looker On" did not see it also. Consequent upon its being published in English, it cannot be read by many of my countrymen with facility, but if it were translated into French I am sure it would have a large circulation in this country. Mr. Hoskold and his publishers ought, therefore, to take my suggestion into consideration. All that I have said as to value has, apparently, been lost upon Mr. R. Symons, who evidently entertains the idea that it is sufficient if intended purchasers were to "employ an honest mine agent to report on it." No doubt that is part of what should be done, but not the whole of it.

On referring to Mr. Hoskold's work "Looker On" will discover that the mode of valuing he has set forth, as being contained in the work in question, only represents a portion of the system. After all possible means—best known to mining engineers of great experience and geological knowledge—have been applied with a view of determining whether a given mine contains a sufficient quantity of minerals to justify further investigation, there follows the consideration and determination of all those points involved in a close estimate of the cost of development of the proposed mine. This being settled, the rate per cent. which shall be allowed to a purchaser is also settled, we then obtain the value immediately from the tables contained in Mr. Hoskold's work, wherein all such matters are fully elaborated.

I am much obliged to "Looker On" for giving me the opportunity of setting myself right, and I have taken the opportunity of answering in a cursory manner some of his enquiries. I think I ought to state that Mr. Hoskold has shown that the tables existing prior to his were greatly in error when the rate per cent. allowed is higher than the normal rate of interest to be obtained on money, that is, supposing the interest allowed to a purchaser is 20 per cent. per annum, those tables hitherto employed assume that the capital can be redeemed at the same rate per cent. The basis upon which they are constructed is consequently in error, whereas Mr. Hoskold's tables are calculated on the principle of redeeming capital at a practicable rate, while at the same time a different rate is allowed to a purchaser. This, of course, is a matter of great importance, as by the old tables a great loss was entailed upon a purchaser, whereas by the new method, employing the tables of Mr. Hoskold, it is saved. I do not think it would be consistent for me to infringe upon the province of the author by entering further into details, and I have to apologise for entering into as far as I have. A. LEON.

Rue Delambre, Paris, July 21.

[For the information of those who have not seen any description of Mr. Hoskold's Valuation Book we have given on page 753 of this week's *Mining Journal* its title and also extracts from a few of the reviews that have appeared. Since the time when we had the pleasure of reviewing the work many circumstances have occurred in connection with the subject of valuation to confirm the view we then took of Mr. Hoskold's work.—Ed. *M.J.*]

"SCIENCE OF INVESTMENTS."

SIR,—In an article published in the Journal at the close of the year 1869 we referred to the outlay and prospects of the subjoined mines, and impressed on our readers that many companies had been worked at a loss, or merely to meet costs, owing chiefly to depreciated prices of copper and the great depth of workings. We remarked:—

The United Mines, in Gwennap, afforded gains exceeding 800,000*l.*, and for many years ranked as one of the most important mines in Great Britain. The Clifford Amalgamated now absorb these workings, yet, as a whole, the undertaking does not pay, and probably the day is not remote when the whole run of mines will become suspended.

These mines culminated in hopeless insolvency, and have long ceased to be worked.

The Great South Tolgus has proved a good mine, but the veins of copper are profitable only to a depth of 100 fathoms. East Crofty gave dividends of 78,000*l.* on 12,000*l.* capital under the management of the late Capt. Nicholas Tredinnick, but the copper ores wrought at profits were all extracted during his lifetime.

Both of these mines have been abandoned since our reference thereto in March, 1870.

We could proceed with numerous other cases in which our predictions proved correct, and we add that there are many mines still at work well worthy the study of the pupils of the "Science of Investments," where costs of drainage with discharge of ores and debris from underground to surface, render the works most expensive, and in the face of ruling prices for metals necessitating enforced sales to meet costs, and gradually absorbing usual profits, as shown in diminished dividends. This class of mines are of little advantage to investors, however rich they may be in mineral. They are valuable alone to landlords, merchants, executives, and workpeople. The localities in which the mines are situate are advantaged through labour, with consumption of materials and machinery. But the dividends to shareholders are shrinking whenever reserves are trenched upon to keep up returns. The pioneer points should be watched, and it should ever be borne in mind that whenever discoveries fall short of sales, incipient exhaustion becomes apparent to all those who act in accordance with sound finance and the "Science of Investments." We would call the attention of the earnest disciple to the following properties, all of which are rich in minerals, but sadly afflicted by the low prices of lead, copper, and tin—namely, Minera, 612,750*l.* profits in dividends; Lisburne, 239,000*l.*, last dividend 20s. in March; Wheal Basset, 350,000*l.*, heavy calls and accumulated debts; South Frances buoyant, with renewed dividends after heavy expenditure. West Basset, after yielding some 200,000*l.* dividends on 9000*l.* capital, sells at 25,000*l.*, after calling up 31,000*l.*, with a heavy accumulated debt. Leadhills, with 15,000*l.* working capital, introduced some three years ago with 105,000*l.* capitalised purchase-money, now selling at 30,000*l.* to 40,000*l.*, with no dividend since March, 1878. Melianear, West Tolgus, and South Caradon, the three best copper mines in the south-west peninsula, and selling respectively at 35,000*l.*, 10,000*l.*, and 25,000*l.*, just combined the value quoted of D'Eresby Mountain and Llanrwst. Again, Wheal Owles, after giving 522*l.* 10s. a share in dividends, is in debt fully one-half the amount, after making heavy calls. Can this mine possibly be worth anything at ruling price of tin to anyone but lords, merchants, officials, workpeople, and tradesmen? Again, we referred to

East Pool as being in 1870 one of the most profitable mines in Cornwall, adding that it was discovered by the same successful miner as profitably worked the East Crofty some 35 years previously; first dividend 1836, when the 5*l.* shares rose to 500*l.* and 600*l.* each.

Nine years have passed since we referred to it in our second number of "The Science of Investments," and we are pleased to observe that the dividend this month was the largest declared since the opening of the works. In reference to Carn Brea we added—

That upon an outlay of 15,000*l.* dividends of 278,000*l.* had accrued, while at one time the value stood at 300,000*l.* We further remarked that copper mines yield most profits at depths ranging from 40 to 100 fms. below surface, while many cease to afford gains at the depth of 150 fms., and referred especially to Carn Brea, Buller, East Pool, North Roskear, Seton, Stray Park, and North Crofty, and added that the future hung solely on tin in depth.

All these mines have ceased to work save East Pool and Carn

Brea. The result of the first is given above, while that of the latter is 30,000*l.* profits since our notice in 1870, with calls of 41,375*l.*, and a large accumulated debt. On the contrary, we would call the attention of the studious to Wheal Eliza Consols, which has repaid back through careful and good management the entire outlay and 1540*l.* in addition; South Condurrow 10s. dividend; Wheal Peevor, 10s., with equal and advancing prospects, yet selling for 27,000*l.* against 72,000*l.* for South Condurrow; the splendid prospects of North Hendre, selling at 52,000*l.* versus Rhydalun, 55,000*l.* The anomilies of mining is somewhat curious and instructive also.

In conclusion, we would observe that mining, like shipbuilding, constructive enterprise (such as the Suez Canal, the Isthmus of Panama, the Great Pacific Railway, the High Level Bridge at Newcastle, the Channel Tunnel from Dover to Calais), or the ending of the Zulu war, requires talent, science, intelligence, and ceaseless energy and perseverance, so the "Science of Investments" can prove of no practical use unless through study it becomes searching, and when so applied earnest and grasping in its scope. *Nil desperandum* is the watchword, and perseverance the motto, of every true-bred miner.

R. TREDINNICK,
Owner of Mines and Consulting Mining Engineer.

38, *Cornhill, London, July* 22.

PENSTRUTHAL CONSOLS—PATENT STEAM PUMPS.

SIR,—I am sorry my suggestion about enquiry into the merits, or otherwise, of the patent steam pump should have stirred up the bile of "Miner," but as he is not, according to his own statement, an interested party (except in the matter of a sale, perhaps, of a Cornish beam to the powers that be) in the affair, I am sure he will excuse me in referring him, in his doubtful acquaintance with such rivals to his old friend of many years standing, to a report on steam pump enterprise which appeared in several newspapers in 1872. The article published in the *Mining Journal* of the 5th inst. is, however, full of suggestion to those interested. "Miner" says he is not, so I suppose it need not trouble his mind much, but lead those who have the interests of the property at heart, and who desire to economise every penny of any amount obtained, in looking out of the county of Cornwall for something worthy of their attention.

I am quite sure that "Miner" would hardly dare to criticise the action of well experienced colliery owners (and I fancy that pumping requirements in such undertakings are not exceeded much, if at all, by metal mines) in the North, and other parts of England and abroad. He must admit that such men are unlikely to buy an article so pregnant, as he would have your readers believe, with faults as should, and that rightly, if his remarks are verifiable, which I deny, at once annihilate the trade in them. "Miner" is evidently under the impression that mining, whether shallow or deep, is beyond their capabilities, but it may be, when he has better informed himself on such valuable aids to mining enterprise as steam pumps evidently are, in spite of old-fashioned prejudices, that even "Miner" may regard them differently than he evidently does at present.

However, as an uninterested gentleman like "Miner" informs us that Mr. Waddington is a pioneer in the West in the matter of boring machines, and possibly other mechanism, I feel certain that the gentleman in question will not feel sore by my previous suggestion, but use his best discretion in the matter; and although perhaps he, like "Miner," having an affection, and very properly so, for such grand specimens of mechanical skill as Cornish beam engines undoubtedly are, yet nevertheless he will, I trust, look around him to save every 100*l.* available in the proposed scheme. Enquiry is only suggested before purchasing the contemplated 70-in. engine (I note by your advertisements there is the article awaiting someone at Williams, Perran, and Co.'s Foundry) and its necessary surroundings, and if nothing better can be found why then, by all means, buy the county type, but otherwise stay the hand.

To astonish "Miner," perhaps, a little more at my audacity, I may suggest that instead of a steam pump in lieu of Cornish beam being recommended, and were the water supply available as in many parts of England, I would draw attention to Leffeel's improved double turbine, and made by Messrs. Thomas McKenzie and Sons (Limited), Hibernia Works, Victoria Quay, Dublin, whose experience in waterwheels for mining and other purposes would enable them to afford him information as would probably upset him altogether, looking at the grand specimens of wheelwrights' work formerly in action at Great Friendship Mines, near Tavistock, &c., and through the country and abroad.—*London, July* 21. WEEKLY READER.

PENSTRUTHAL CONSOLS.

SIR,—Kindly correct in your next issue an error in my letter on these mines, and published in your last week's Journal, and oblige. The passage is printed thus: I admit the erections necessary for a Cornish engine are costly, as is also the engine itself, "but it is not due always to be relied on." It should have been, "but is it not *one* always to be relied on?"

A MINER.

PARYS COPPER CORPORATION.

SIR,—As Mr. F. R. Wilson questions my veracity in your report of the proceedings at the meeting of this company last week I hope you will oblige me by inserting the following facts. I joined the board of the late Parys Mountain Company in February, 1878, and seeing how great the expenses then were, and that the financial position of the company was getting from bad to worse, I soon afterwards visited the mine to ascertain by personal inspection the best means of putting a stop to the heavy expenditure then in progress. I may here remark that I believe none of the other had, at any rate for a very long time, been on the mine, but that during the year 1878 I went there three times, in each case at my own expense. The result of my inquiries on the spot, and subsequent representations to the board, led to instructions being sent down for considerable reductions in the cost.

When I joined the board of the Parys Company the working expenses were about 450*l.* per month; these were reduced to about 250*l.* The local management cost (in addition to 14*l.* 14s. paid by Morfa Du), 28*l.* 7s., this was brought down to 17*l.* 17s., while the directors' fees were reduced from 250*l.* per annum to 166*l.* 13s. 4d. Notwithstanding the savings thus effected I was, and still am, of opinion that compared with other mines the Parys expenses were much too high, and in confirmation of this I quoted at the last meeting the amounts paid by other companies of which I am a director.

The accuracy of my statements having been impugned by Mr. Wilson, I have extracted the following figures from the books of the two companies I named. South Darren, 110 fathoms deep; 98 men employed underground; ore sale for June month (exclusive of copper), 682*l.* 10s. Local management expenses, 16*l.* 16s. per month. East Roman Gravels, 90 fathoms deep; local management expenses, 14*l.* 14s. per month. Mr. Wilson said there was no comparison to be made between these companies and Parys, which, 90 fms. deep, requires a local staff costing 28*l.* 7s., in addition to the 14*l.* 14s. paid to the same agents by Morfa Du, in some respects he is perhaps correct.

I think the foregoing will be sufficient to show that Mr. F. R. Wilson's remarks were as deficient in accuracy as in taste, and that the statements made by me are fully borne out by the facts of the case. I am, therefore, entitled to demand that the objectionable remarks publicly made by Mr. Wilson shall be, through the medium of the Journal, as publicly retracted. I was proposed as a director of the Parys Copper Corporation at the meeting on the 18th inst., and the proposition was duly seconded by a shareholder in the room, with whom I was previously unacquainted. To my surprise, however, Mr. F. F. Wilson (the secretary) objected to my seconder on the extraordinary ground that he was registered as the executor of a deceased shareholder, and, therefore, not qualified to second a proposition. The Chairman having sustained this objection, and there being only two other shareholders in the room, who had respectively moved and seconded the re-election of the retiring directors, it was decided that the proposition could not be put to the meeting.

In conclusion, I have only to assure my fellow-shareholders that although a technical, and I believe illegal, objection has temporarily prevented my candidature for a seat at the board being formally brought before them I shall continue the exertions I have hitherto made to obtain greater economy and supervision of expenditure. At the next general meeting, however, I trust the shareholders will personally attend to enforce that economical method of working for which I have striven, and by which alone we can ever hope to attain the long deferred success of Parys. THOMAS BUSH.

Lavender Bank, Farningham, July 23.

THE LLANRWST DISTRICT.

SIR,—If Mr. Knapp will refer to the *Mining Journal* for March 29 of the present year, page 322, he will find the exact words I quoted—"Capt. Knapp says that 10,000*l.* will be sufficient for his requirements." If there has been any "perversion of truth" it does not rest with—

T. C.

LLANARMON MINING.

SIR,—The successes attending the few trials in this district tend to show what might be achieved if only a moderate amount of capital were expended in developing the highly mineralised lodes known to exist. At Plas-ddu Mines, in sinking No. 4 shaft on the Maes-y-pwll lode, the main leader of the big run of ore has been cut. From the outcrop 80 yards west the former workers extracted an immense quantity of ore. The company has ⅔ mile on the run of five lodes, so they have a splendid future before them. A few hundred yards east the Bodidris Company discovered a fine run of ore on this (Maes-y-pwll) lode. In the western part of the Pant-y-gwlanod lode some very good ore has been met with, and at Bog-Issa Mine, on the Great Nant lode, in clearing the 40 yard level, west of gin-shaft, several rich pitches have been opened out, and the discovery in the roof of this level still continues worth 2 tons of lead ore per fathom, and is in whole ground. AN OLD MINER.

MINES IN CORNWALL AND DEVON.

SIR,—In the year 1867 I took an account of all the mines in the two counties—those that were idle as well as those at work. The total number I found to be 797. Of these only 56 are now being worked. In 1867 about 300, I believe, were worked in a partial or full measure. Many of those abandoned have been subjected to the "winding-up" process in the Stannary Court. When the mines now under that process have been disposed of the Registrar and his subordinates will have ample leisure for recreation, for they will have little to do, I imagine. At the present time they are very busy in pressing forward their work with all practicable dispatch. Under the late Registrar's administration complaints of delay were justifiable, but not so now.—*Truro, July* 22. R. SYMONS.

COAL AND MINERAL WASHING MACHINERY.

Further improvements in his machinery for the washing of coal and other minerals have been recently patented by Mr. EDMUND EDWARDS, C.E., of Southampton Buildings. The apparatus consists of a screen, circular in plan, and arranged horizontally in a circular vessel containing water, the coal or other material which is to be washed being fed upon it through a central hopper, through which water is also supplied. At the centre of the screen is a vertical cylinder, the upper end of which is somewhat higher than the edge of the outer vessel, its lower end being closed or resting upon a plate which occupies the centre of the screen. Outside this inner cylinder is a second cylinder of somewhat greater diameter, and having its upper edge level with that of the inner one; its lower edge, however, does not reach down to the screen, but leaves an annular space between them all round.

Outside the outer vessel is an annular trough, the bottom of which is some distance below the outer edge of the vessel, whilst its outer vertical side rises as high or as higher than the edge of the vessel, and outside the annular trough is a flange upon which run friction wheels fitted to the outer ends of three radial bars, which unite at the centre of the machine and fit upon the end of a central vertical shaft which passes down through the central plate. The vessel is made conical below the screen, tapering downwards until it ends in a chamber, into which the fine particles passing through the screen fall. The lower end of the vertical shaft or axis revolves in a step or bearing at the bottom of this chamber. The vessel, arranged and fitted as described, communicates at any convenient part below the screen with a vertical cylinder containing a piston or plunger, which can be made to work rapidly up and down in it by means of an eccentric or cam, set in motion by steam or any other convenient power. The bars or arms carrying the wheels running upon the outer flange, already described, are made to revolve slowly by means of bevilled toothed wheels driven by the same power which actuates the plunger, and to the radial arms are attached adjustable scrapers, arranged spirally, and having the positions of their lower edges adjusted so that they dip sufficiently into the coal or other material upon the screen. The action of the apparatus, arranged as described, is as follows:—The coal or other material which is to be washed being fed into the apparatus through the central hopper (below which is arranged a distributing plate, which prevents the coal from falling into the central cylinders), and the plungers being set in motion, the heavy parts settle upon the screen, whilst the lighter parts become arranged in positions corresponding with their several relative specific gravities.

When the space above the screen is full of material thus washed, the spirally arranged scrapers attached to the revolving arms scrape and force the upper part of it towards the outer edge of the vessel and over it into the annular trough. At one part of the bottom of this annular trough an opening is made, and a scraper is fixed to one or more of the revolving arms, which scrapes round the material delivered into the trough, and discharges it through the opening, which may be connected by a spout or shoot with a wagon or other receptacle. The apparatus for collecting and delivering and discharging the heavier parts of the coal or other material which settle upon the screen is constructed as follows:—A spirally shaped scraper or bar is attached by bars to one or more of the revolving arms, already described, and is adjusted so that its lower edge passes round at a short distance above the perforated plate or screen; this scraping bar has but little depth, and its spiral shape is such that as it revolves it collects the parts of the material which lie upon the screen, and draws them towards the centre of the apparatus, where they accumulate, passing under the lower edge of the outer central cylinder, and filling to a certain height the annular space between it and the inner central cylinder. To one of the revolving arms is connected a hinged scraper, which is drawn round in this annular space, its lower edge (the height of which may be made adjustable) collecting and scraping up the heavy material accumulating there, as described. In one part of its revolution is an inclined plane in the space between the two cylinders, up which it is forced to travel, drawing with it the material, which it discharges through an opening at the top of the inclined plane above the level of the water in the machine. Another inclined plane then descends, down which the scraper travels, and then collects a fresh supply of the material.

The stuff discharged through this opening in this way passes down a pipe or passage leading from the opening at the top of the inclined planes, and thence laterally into the central inner cylinder, whence it passes through the central plate and diagonally downwards until it passes out through an opening in the side of the lower part of the machine. The heavy parts of the material are thus continuously collected and discharged through this opening without stoppage of the machine or loss of water. In order to deliver and discharge the sand or other fine particles which pass through the perforated screen into the lower or conical part of the vessel, and thence into the chamber, as already described, an endless chain of scrapers is used, actuated by the power which drives the machine, and drawing the fine particles or sand up a passage or pipe of corresponding section, which is continued to a sufficient height, and thence discharging them into a shoot or discharging pipe. The buckets or scrapers thus emptied then return through another corresponding passage or pipe, within which they fit as closely as possible.

The operation of the improved machinery, which is being manufactured by the Grange Iron Company of Durham, is thus continuous in every part, and the coal or other material is washed or cleaned with very little attention so long as the rough material, together with the small quantity of water required, is supplied, there being no necessity for stopping the machine at intervals for the purpose of cleaning it, whilst the cost is very small, being estimated at less than 1d. per ton of coal.

ENGLISH IRON AND STEEL MANUFACTURES AT THE AUSTRALIAN EXHIBITION.

Messrs. John Brown and Co., of the Atlas Works, Sheffield, have prepared for the Australian Exhibition a trophy which includes specimens of 9-in. armour plates in iron and steel and iron, showing the effect of the steel in resisting penetration; a model of the shot for the 100-ton gun, weighing 2000 lbs., measuring 17 in. in diameter, and 3 ft. 8 in. long; a specimen of the old forged steel shot, 20 in. in diameter, shown simply as a specimen of forging; two boiler plates, the largest steel plates ever rolled, one 10 ft. diameter by three-quarters thick, unflanged; the other originally 10 ft. by 4, now 9 ft. by 3, flanged on the outer circumference. There is also a splendid specimen of casting in the form of a steel propeller, similar to those fitted into the steamer, Gallia, and tyres from 18 in. to 9 ft. 4½ in. in diameter; T rings for traction-engine wheels, 8 ft. 4 in. in diameter by 9 in., and 9 ft. by 4; iron and steel castings of every description; Eave's safety valve, buffers, springs, fractures and test-pieces of steel, files, &c. The exhibit, which weighs between 25 and 30 tons, is surmounted by a massive representation of the trade mark of the firm—Atlas bearing the world on his shoulders.

Messrs. Turton Brothers and Matthews, of Sheffield, have prepared for the Australian Exhibition a trophy consisting of an elaborate and effective arrangement of steel bars suitable for mining and engineering purposes; conical, volute, and spiral springs for railway and other purposes; Timmis's patent springs, of which the firm are the sole makers; engineers' tools, files, steel fractures, bicycle steel, chisels, hammers, smith's tools, mill-picks, &c. The exhibit includes no fewer than 100 bars of tool steel, arranged in the form of a trophy rising from the centre of a raised platform, the height being about 10 ft. from the level of the floor. There are files from the small article used by watchmakers of about 1 in. in length, and weighing about one-sixteenth of an ounce, up to a mammoth hand-cut rubber, measuring 4 ft. 6 in. long by 4½ in. square, and weighing about 2½ cwt. The latter is a marvellous specimen of the file-worker's craft. The chisel used in the cutting had to be driven by a 48-lb. hammer, which, of course, had to be balanced by the single arm of the workman. It is believed to be the largest file ever made. There is also shown the largest hand bastard file ever produced, 4 ft. long, and a double dead smooth file, so finely cut that one can only detect the handiwork of the cutter by passing the thumb-nail over the face of the file. Messrs. Turton Brothers and Matthews have introduced a striking novelty in their exhibit, by means of which they show the whole process of manufacture from the ingot to the finished article. The first portion is left in the ingot, and the other is drawn down and finished on a tool. Every process, from the melting of the steel in the ingot to the final touches necessary to complete the tool, are thus illustrated and brought clearly before the eye of the visitor, who can see the lump of steel at one end and the finished article at the other.

FOREIGN MINING AND METALLURGY.

The attention of the industrial world of Belgium has been directed to some rather important adjudications which the Belgian Government has just announced. Some double story carriages, on the French model, appear to be in contemplation upon the Belgian State Railways. The house of Rolin, of Brain-le-Comte, carried off an order for turntables which was recently let at the North Brussels station. A pretty good current of orders is still noticed in the Belgian iron trade, but prices show considerable weakness, notwithstanding the better tone which prevails, upon the whole, upon the French markets, and the apparent revival indicated in Germany. The Belgian Government has approved the tender of the Sclessin Company for the construction of an iron goods shed at the West Brussels station. The amount of the tender submitted by the Sclessin Company was 5607*l.*, or 123*l.* less than the estimate.

The company formed for working the Netherlands State Railways has laid experimentally 2½ miles of iron permanent way on the Serres and Battig system between Boxtel and Eindhoven. The work of establishment only lasted five days. Several different kinds of ballast were tried—basalt from Germany, porphyry from Belgium, refuse from certain dismantled fortresses, and fine sand and gravel from the Meuse. Several engineers and officials of the Netherlands Government have inspected the newly-laid section. All the iron and steel used in the work of re construction came from Belgium.

In the Belgian coal trade an extremely quiet tone has prevailed. There is some appearance of activity in the rivers and canals, but this appearance is somewhat delusive, as it is the result of the approaching stoppage of several navigations which has induced the managers of mines to hurry on the delivery of coal which they may have contracted to supply. There is some enquiry for coal on the part of the sugarworks and brickyards, but this has had no effect upon prices, which have remained feeble. The quotations which prevailed at the last adjudication for coal for the Belgian State Railways were certainly not calculated to induce a revival in the Belgian coal trade generally. The iron trade has purchased a fair amount of Belgian coal of late, but the glassworks have taken less than had been anticipated. Coal, coke, and agglomerates will continue to be imported into Germany free of duty.

The Mondragon Collieries Company has reported progress for 1878. No profit was realised for the year, and working operations were carried on with no great vigour during the 12 months, although only about one-tenth of the concession has been at present attacked. The company, like many other industrial undertakings, has suffered severely from the depression of the times.

In the French department of the Haute-Marne pig for second fusion has been in fair request during the last few days, and a tolerable amount of business has been done. Prices have been pretty well maintained. The production of pig for refining has been reduced to a very low point. There has also been only a comparatively limited demand for machine iron. In the Meurthe-et-Moselle pig for refining has been dealt in at 2*l.* 3s. 3d. to 2*l.* 4s. per ton. In the Loire-et-Rhone stock-taking has occupied a good deal of attention, and business has been restricted in consequence.

In the French coal trade the dead season is now at its height The coal yards are generally well filled, and no revival can be anticipated until September in household coal. The demand for industrial coal also shows at present a good deal of dulness, but a revival in the inquiry for this description of coal is expected to take place sooner than in that for household coal. This expectation is based probably on the idea that there will shortly be some demand for coal on the part of the French iron trade. A slight increase is talked off in the import duty imposed on foreign coal entering France.

During the year 1878 as much as 20,000,000 pouds of naphtha were obtained from 165 shafts sunk in the neighbourhood of Baku, in Russia, but only 6,250,000 pouds were exported. When the railway to Tiflis is completed the proprietors of naphtha grounds hope that the trade will rapidly grow to considerably larger proportions.

Some figures now published show a very considerable expansion, not only in the production but in the marketing of coal in the United States during the current year. According to an estimate by a competent authority 11,885,649 tons of anthracite were carried by the several coal-carrying companies during the six months ending June 30, this quantity being 4,636,401 tons more than was carried during the corresponding period last year. The large expansion of the trade is attributed to the general revival of business, and also to the introduction of anthracite coal into the western and north-western Cities and States. This extension of the area of demand is a result of low prices, the bituminous coal hitherto used on account of its relative cheapness being much disliked. Chicago, St

Louis, Cincinnati, and other places have taken twice the quantity of anthracite that they took last year. As the quantity forwarded exceeds the current output, the coalowners have been able to advance prices somewhat, and are understood to be acting in concert with this object. There appears to be some dissatisfaction amongst the colliers on the score of wages.

THE SCOTCH MINING SHARE MARKET—WEEKLY REPORT AND LIST OF PRICES.

During the past week the market has remained inactive, although prices in many cases are low enough to appear very advantageous to investors. The want of any sign of trade improving seems to be the principal influence that keeps investors back, with the additional discouragement that the harvest may be deficient and cause trade rather to turn worse. For the last few days the state of uncertainty has been slightly relieved by an improvement in the weather, and more favourable news from South Africa, but no important alteration can yet be noted.

In shares of coal and iron companies, Ebbw Vale and Glasgow Port Washington (prepaid) are each 2s. 6d. per share higher on the week, but Shotts are offered at 10l. reduction. Benhars dropped to 22s., but have since improved to 24s. 6d. The meeting of the Glasgow Coal Exchange Company is to be held on July 30, and that of the Fife Coal Company on Aug. 1. Andrew Knowles and Sons are 12½ dis.; Bilbao, 12¼; ditto 6 per cent. preference (50l. paid), 40; ditto (35l. paid), 25; Bolckow Vaughan, A, 45 to 50; ditto B, 30; ditto stock, 95; and ditto 6 per cent. (pref.), 19. Cardiff and Swansea, 20s.; Charles Cammel and Company, 30¼ dis.; ditto 5 per cent. (debentures), 100; Chillington, 37s. 6d.; Ebbw Vale, 30s; John Brown and Company, 44 dis.; Marbella, 25s. to 27s. 6d.; Muntz's Metal, 20s. prem.; Newport Abercarn, 90s.; Pelsall, 10½ dis.; Rhymney, 10; Sandwell, 12s.; Scottish Australian, 36s. 3d. to 38s. 9d.; South Wales, 45s.; Staveley, A, 5½ dis.; ditto, B, 31s. 3d. dis.; and ditto D, 10; Tredegar, A, 13; Wigan, 50.

In shares of foreign copper and lead companies Huntington have improved 6d. per share, but Cape are 20s. lower; Tharsis, 11s. 3d.; Rio Tinto, 5s.; Tharsis (new), 2s. 6d.; and Canadian, 6d. Tharsis shares have gradually drooped from 22l. 10s. to 22l. 1s. 3d. Cape are 27½. English and Australian, 22s. 6d. Fortuna, 30s. New Quebrada, 42s. 6d. Panulcillo, 1os. to 25s. Rio Tinto 5 per cent., 68¾. Yorke Peninsula, 3s. 9d.; ditto (preference), 5s. to 1's.

Shares of home mines continue without feature. The sale of copper ore by the Glasgow Caradon Company last Thursday (computed 190 tons) realised 695l. 6s., or an average of 73s. 2½d. per ton. Last month's sale was 180 tons, at 80s. 4d., while the sales in the month of July for some years past have been:—In 1878, 200 tons, at 77s.; in 1877, 245 tons, at 91s; in 1876, 245 tons, at 92s. 5d.; in 1875, 241 tons, at 110s. 8d.; and in 1874, 240 tons, at 104s. 5d. This was the company's seventh sale for current financial year, and the total proceeds of these sales, compared with the sales in the corresponding period last year, show a decrease of 691l., which is accounted for by there having been 219 tons less ore sold this year. Aberdaunant are 1s 9d. Carn Brea, 25. Devon Consols, 35. Dolcoath, 26. East Pool, 10. East Van, 17s. 6d. to 20s. Gorsedd and Merilyn, 46s. Great Laxey, 14½ to 15½. Herodsfoot, 6 s. Killifreth, 4s. Marke Valley, 12s. 6d. Mellanear, 75s. Monydd Gorddu, 41s. Parys Corporation, 10s. Penstruthal, 2s. 6d. Roman Gravels, 7½. South Condurrow, 12½. South Frances, 7¼. Tankerville, 45s. Tincroft, 9. Van, 15. West Basset, 80s. West Seton, 15. West Tolgus, 20. Wheal Grenville, 6 s. Wheal Peevor, 9½.

In shares of gold and silver mines, Richmond have fallen 12s. 6d., to 7½; this week's run is $55,000. The Richmond Company paid a dividend about this time last year. The profit at St. John del Rey for June is 6400l., and produce, first division July, 12,000 ozts., yield 5·8. Almada are 7s. 6d.; Argentine, 1s. 9d.; Australasian, 2s. 6d. to 7s. 6d.; Chontales, 6s. 3d.; Colorado, 32s. 6d.; Don Pedro, 12s. to 14s.; Eberhardt, 40s.; Exchequer, 2s. 6d. to 5s; Flagstaff. 2s. 6d. to 3s. 9d.; Javali, 4s. to 6s.; London and California, 1 s. 6d.; Pestarena United, 4s. to 5s.; ditto 12½ per cent. (pref.), 15s. to 20s.; Port Phillip, 8s. 9d. to 10s.; Sierra Buttes, 2½; United Mexican, 2¾.

Oil companies shares show no alteration. Very little business has been done in Young's Paraffin, at 13¼. New Patent Candle are 21½; Price's Candle, 8½ to 8¾.

In shares of miscellaneous companies business continues quiet. Earle's Shipbuilding 25 dis.; Milner's Safe, 8½; Palmer's Shipbuilding (B), 15½ dis.; and Phospho Guano, 5 to 5½. Prices of wagon companies' shares are—Birmingham, 12¾; Bristol and South Wales, 6 s; Gloucester, 5⅞; Metropolitan, 1¼ prem.; Midland, 8¾; Scottish, 9½; and Swansea, 1¼. In shares of chemical companies, Lawes' (pref.) shares and Langdale's, at 3¼ to 4, are higher. Lawes, 7⅞ to 8; Odams, 16¾; and Newcastle, 2.

SCOTTISH WAGON COMPANY (Limited).—The report of this company for the half-year ended June 30 states that 410 wagons have been added to stock, at a cost of 14,937l., and 393 wagons have been sold to lessees in terms of agreements. The total number of wagons now running is 14,384. The net balance of revenue account, after deducting from wagon rents the amount applicable to capital and charging all expenditure in full, is 6896l. From this sum a dividend at the rate of 5 per cent. is recommended, which compares with 6 per cent. last year. This leaves 596l. to be added to the reserve fund, which will then amount to 8202l.

AUSTRALASIAN MINES INVESTMENT COMPANY (Limited).—The report of this company for year ended March 31 last, to be submitted at the meeting on July 29, states that the whole of the mines in work at date of last report are stated to be still in operation, and ten of them have yielded dividends instead of six in the previous year. Unfortunately the Alburnia has yielded only 51l. instead of 69 l. as in the preceeding year, after three years utter unproductiveness, a striking example of the uncertainty of all mining. The calls which must always be expected have been fewer and lighter than in the previous year, and amount to 74l. The result of the years' operations is that the cash balances and bills have increased 39l. to 106l. It has not been thought necessary to dispose of any of the shares held by the company this year. The Garden Gully, Victoria Reef, and some others have given fair returns. This company holds in 22 undertakings, from 18 of which it has at one time or another drawn dividends. The secretary, who was appointed at 200l. a year by the Articles of Association, has been altered to 100l. yearly on terms of six months notice, but the directors now ask for remuneration. The constant liability of this company for calls renders it necessary to keep a good balance in hand. The whole calls paid in 1877-8 on ten mines have this year been almost repaid by dividends on three of them. On account of this liability it is not considered desirable to pay a dividend out of the present balance, besides the Articles of Association forbid payment of any unless out of profits arising from the business of the company, which, on the whole, has shown a loss, although there have been profits on the last two years.

Capital. Per share.	Paid up.	Dividends. Rate per cent. Previous.	Last.	Description of shares.	Last price.
£ 10	£8	£ 5	£ 5†	COAL, IRON, STEEL. ...Arniston Coal (Limited)	6
10	10	4	nil	...Benhar Coal (Limited)	24s. 6d.
100	55	25s.‖	25s‖	...Bolckow, Vaughan, and Co. (Lim.)...A.	50
10	10	10	10	...Cairntable Gas Coal (Limited)	6⅛
10	10	4s‖ April, 1876		..Chillington Iron (Limited)	40s.
10	10	—	—	.. Clyde Coal (Limited)	35s.
25	20	10s‖ Dec., 1874		..Ebbw Vale Steel, Iron, and Coal (Lim.)	30s.
10	7	nil	nil	...Fife Coal (Limited)	75s.
10	10	nil	nil	...Glasgow Port Washington Iron&Coal(L)	45s.
10	10	—	—	... Ditto Prepaid	42s.
10	10	—	—	...Lochore and Capledrae (Limited)	15s.
10	10	nil	nil	...Marbella Iron Ore (Limited)	25s.
10	10	nil	nil	...Monkland Iron and Coal (Limited)	24s.
10	10	nil	nil	... Ditto Guaranteed Preference..	47s. 6d.
100	100	nil	nil	...Nant-y-Glo & Blaina Ironworks pref.(L)	15½
6	6	nil	nil	...Omoa & Cleland Iron & Coal (L. & Red.)	8s. 6d.
1	1	15	15	...Scottish Australian Mining (Lim)	37s. 6d.
1	10s.	15	15	... Ditto New	17s. 6d.
Stock	100	nil	nil	...Shotts Iron	50

				COPPER, SULPHUR, TIN.	
4	4	—	—	...Canadian Copper and Sulphur (Lim.)...	7s.
10	7	72s 6d‖	60s‖*	...Cape Copper (Limited)	27
1	1	nil	nil	...Glasgow Caradon Copper Mining (Lim.)	20s.
1	15s.	nil	nil	... Ditto New	11s 6d.
10	9¾	nil	nil	...Huntington Copper and Sulphur (L.)...	12s.
4	4	—	—	...Panulcillo Copper (Limited)	20s.
10	10	nil	nil	...Rio Tinto (Limited)	80s.
20	20	7	7	... Ditto, 7 per cent. Mortgage Bonds..	165⅝
100	100	5	5	... Do. 5 p.ct. Mor. Deb. (Sp. Con. Bds.)	70¾
10	10	17½	16½‖	...Tharsis Copper and Sulphur (Lim.).....	22l. 1s. 3d
10	7	17½	16½‖	... Ditto New	15⅝
1	1	—	—	...Yorke Peninsula Mining (Limited).....	3s. 9d.
1	1	—	—	... Ditto, 15 per cent. Guaranteed Pref.	10s.
				GOLD, SILVER.	
1	1	—	—	...Australasian Mines Investment (Lim.).	5s.
5	5	10s.‖	10s.‖	...Richmond Mining (Limited)	7½
				OIL.	
10	8½	—	9	...Broxburn Oil (Limited)	12¾
10	7	5	5	...Dalmeny Oil (Limited)	7
1	1	15	20	...Oakbank Oil (Limited)	39s. 6d.
1	5s.	15	20	... Ditto	10s. 6d.
10	10	2	4	...Uphall Mineral Oil (Limited) "A"	5⅞
10	10	—	—	... Ditto "B" Deferred	10
10	8½	17½	12½	..Young's Paraffin Light & Mineral Oil(L)	13¾
				MISCELLANEOUS.	
50	25	5	6	...London & Glasgow Engineering & Iron Shipbuilding (Limited)	20
7	7	10	5	...Phospho Guano (Limited)	6
10	10	6	5	...Scottish Wagon (Limited)	9⅛
10	4	6	5	... Ditto New	60s.

† Interim. ‖ Per share. * For 1878. ‡ For 14 months.

NOTE.—The above lists of mines and auxiliary associations are as full as can be ascertained. Scotch companies only being inserted, or those in which Scotch investors are interested. In the event of any being omitted, and parties desiring a quotation for them, and such information as can be ascertained from time to time to be inserted in these lists, they will be good enough to communicate the name of the company, with any other particulars as full as possible.

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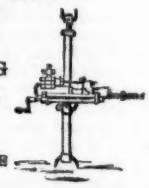

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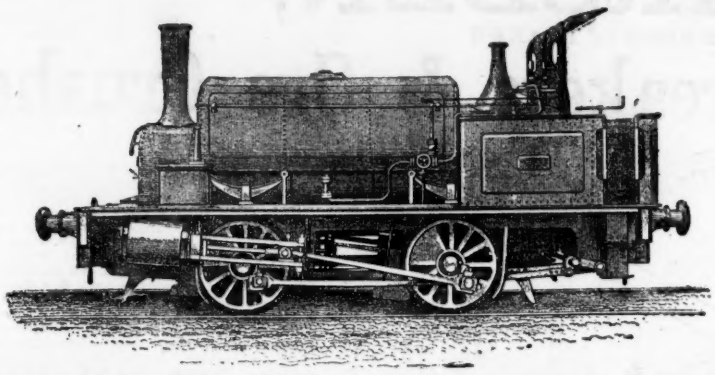

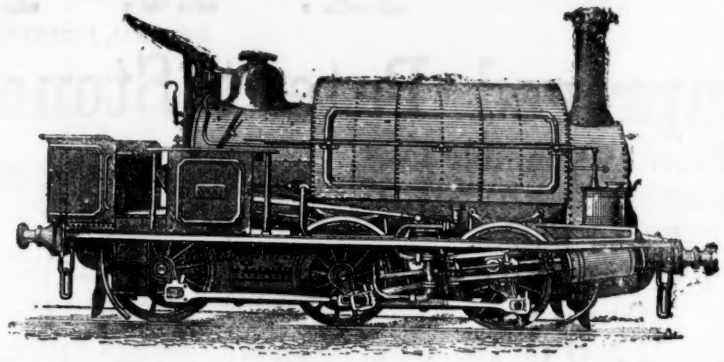

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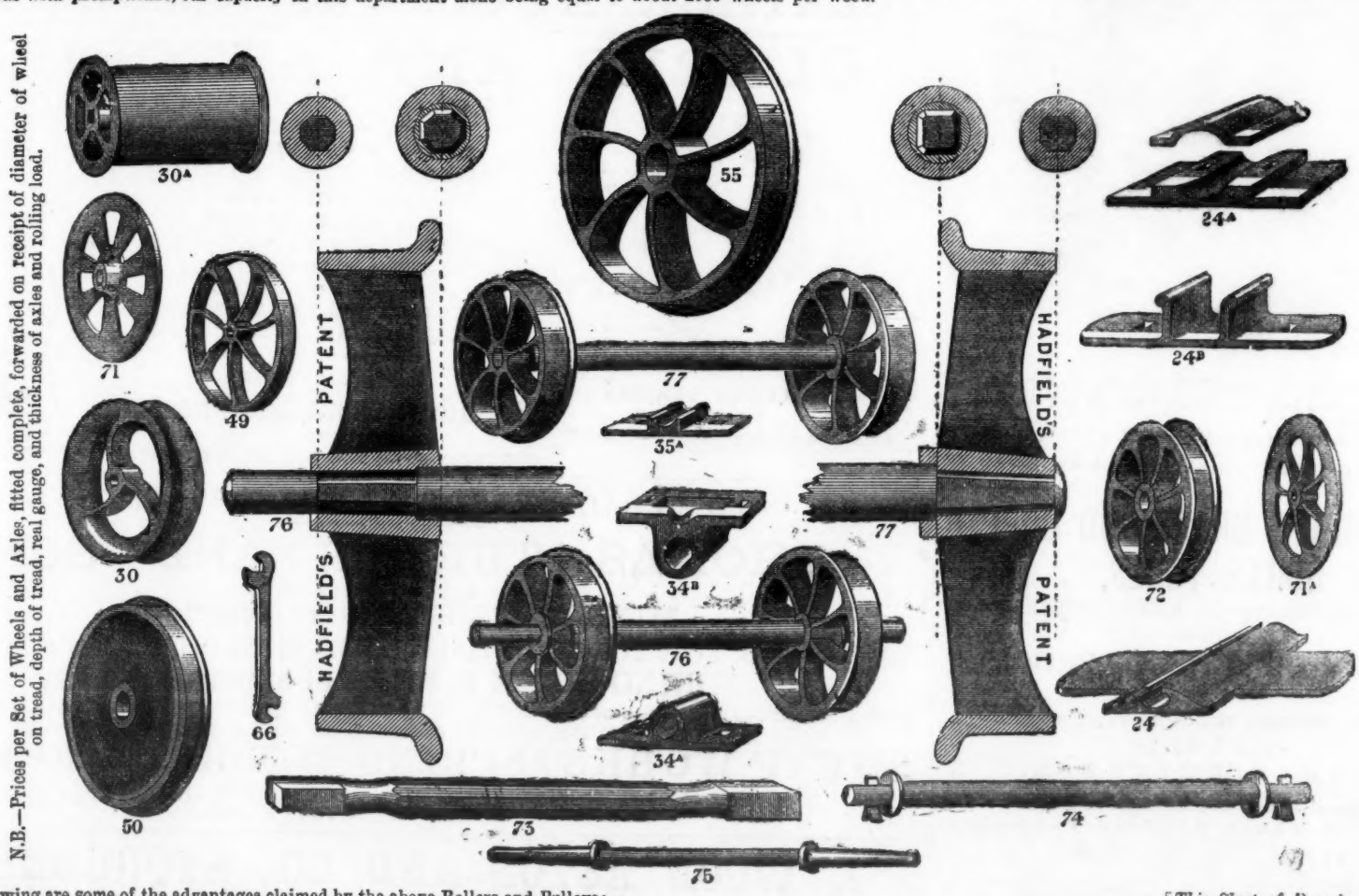

The following are some of the advantages claimed by the above Rollers and Pulleys:—

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Stones broken equal, and Ores better, than by hand, at one-tenth the cost.

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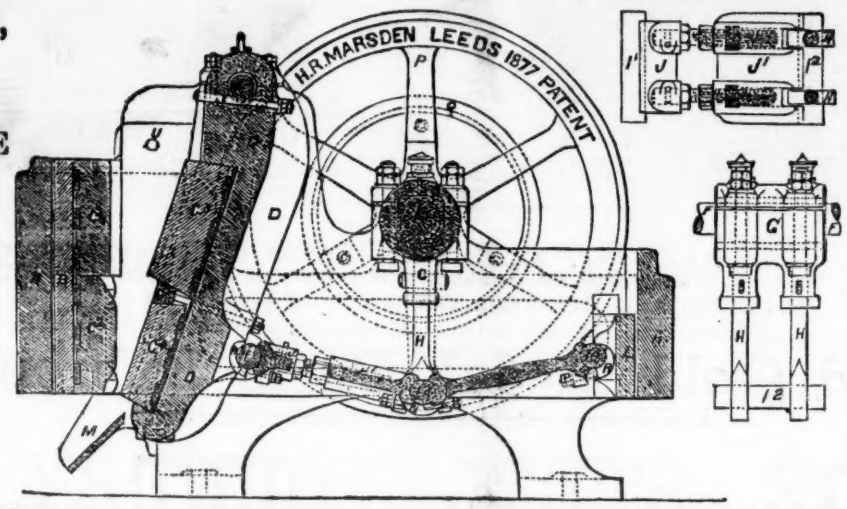

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I am, dear Sir, yours very truly,
WILLIAM MILLER.

AND THIS—

Wharthole Lime Works, Aspatria, Cumberland, July 11th, 1878.

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I am, dear Sir, yours faithfully,
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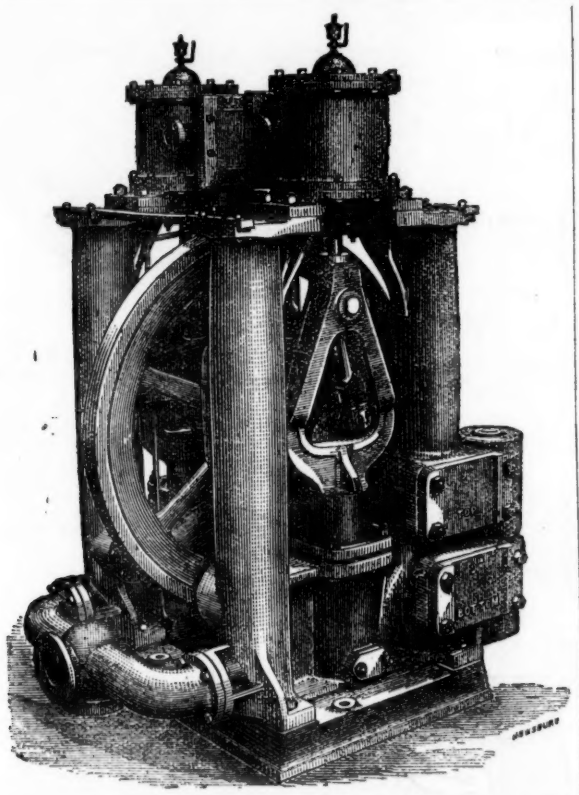

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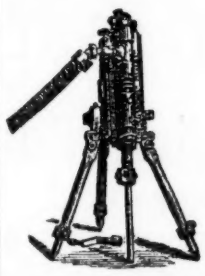

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Simple, strong, and giving most excellent results, and

ELECTRIC BLASTING APPARATUS.

Full particulars of rapid and economical work effected by this machinery, on application.

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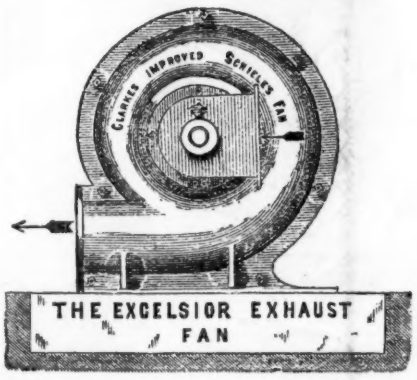

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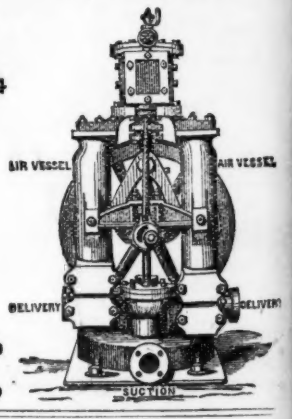

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